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## REVIEWS AND NOTES

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*Statistical Methods Applied to Education: A Textbook for Students of Education in the Quantitative Study of School Problems.* By Harold O. Rugg, Assistant Professor of Education, University of Chicago. Pp. xviii+410. Boston, Houghton, Mifflin Co. \$2.

The use of statistical methods is extending in all directions, even into the arts that are supposed by their votaries to depend in some unknown way upon inspiration or "personality," or a state of grace, or some other mysterious force—such as education and salesmanship. For some fifteen or twenty years people engaged in the teaching business have witnessed the conflict between the old and the new, taking at certain points the form of a struggle between mysticism and exact knowledge. The latter is gaining strength.

There are, indeed, many factors in effective educational procedure that we are quite unable to measure. Nevertheless the scientifically inclined educators insist that we measure whatever can be measured, as accurately as possible. And the result is the development of educational statistics. This book represents the attempt to teach statistical method to men and women who are preparing themselves for the work of teaching, on precisely the same basis as we have in the past taught higher mathematics to students of engineering. Quantitative method is a necessary instrument for progressive and creative work in both fields.

Dr. Rugg realizes the difficulties in the way of introducing teachers to this subject. Most teachers have had little mathematical study beyond high school algebra—and that algebra of a kind that is not usable even for those who "did well" with it as students. The technical text-book on statistics is, therefore, out of the question. To teach empirical rules and formulae would be comparatively easy; but in the long run not worth while. The author chooses the more difficult task of grounding his students thoroughly in the principles and methods of statistics, avoiding so far as possible technical mathematical language in his explanations.

In accordance with the pedagogical doctrine "learn to do by doing," he has the students work out exercises that are selected altogether from the field of school management or education in general. Indeed, the student who gets all of his knowledge of statistics from this book might end up with the distinct feeling that in some way educational statistics is something *sui generis*, having no connection with other kinds of statistics. This appears from the frequency with which the adjective *educational* occurs throughout the book as qualifying "statistics." The fact is that this makes an excellent introduction to the study of statistics for people who will be through with their "education" when they quit their schooling, and who

will want to apply their statistics in other fields, notwithstanding the limitations in the choice of exercises and illustrative material.

Although the author does not assume a knowledge of higher mathematics on the part of his students, he does assume a high degree of mental stamina. In spite of the logical and systematic development of the theme, there are many passages that are unnecessarily involved and obscure, calling for careful rereading even from some who are familiar with the subject matter. There are also occasional slips that will cause trouble to the beginner—five cents for five per cent.; symmetrical distribution for asymmetrical distribution (page 118); “total number of deviations” for “total quantity (or amount) of deviation” (page 167).

The first chapter discusses the uses of statistical methods, and classifies the types of educational problems that lend themselves to quantitative treatment. This is followed by a study of the various methods commonly employed for the collection of data. There are here some excellent analyses of principles to be followed in drawing up question blanks, and in making use of the returns. The tabulation of the gathered data (“educational” data) and the classification of such data for statistical purposes are next described, with an incidental discussion of the value of mechanical devices in such work.

Under the “Method of Averages,” are presented the principles of mode, median, mean (arithmetical, harmonic and geometric), short methods for computing, their distinctive features and special uses. In subsequent chapters are discussed in order the measurement of variability by the range, the quartile, mean deviation, standard deviation, relative variabilities and skewness; the frequency curve and the normal distribution curve; the use of the normal curve in education; correlations; and the use of graphic methods and tables, with illustrations selected from some of the most effective recent reports of studies and surveys.

There is an inserted chart carrying a tabular survey of published quantitative studies of educational administration. The Appendices contain a classified bibliography of quantitative studies in education and school administration, another one on statistical methods, a summary of mathematical formulae, and ten tables of constants and coefficients to assist in computation. Throughout the text there are excellently formulated definitions, summaries and enumerations of the steps to be taken in every type of statistical procedure and computation. There are 80 diagrams and 68 tables; all of these are closely analyzed in the text and furnish excellent illumination for the student. And finally, there is a reasonably complete index.

Perhaps no single factor will contribute so much to the stiffening of educational procedure as well as of educational administration in the years ahead of us as the general acceptance by teachers of quantitative standards in place of the well intentioned sentiments and pious wishes that characterized so much of this branch of public service during the past generation. And to this end Professor Rugg's book will prove a valuable aid.

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